PB84-154111

Evaluation of the IDALERT Device of the Motor Vehicle Information and Cost Savings Act

(U.S.) Environmental Protection Agency
Ann Arbor, MI

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Edward Anthony Barth

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Test and Evaluation Branch
Ann Arbor, MI 48105

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16. ABSTRACT

This report announces the conclusions of the EPA evaluation of the "IDALERT™" device under provisions of Section 511 of the Motor Vehicle Information and Cost Savings Act.

On September 19, 1980, the EPA received a request from Con-Serv, Inc. for evaluation of a fuel saving device termed "IDALERT™" This device is designed to give audible and visual warnings to the vehicle operator that the vehicle engine has been idling for an excessive time period. The objective is to have the operator turn the engine off.

EPA fully considered all of the information submitted by the device manufacturer in the application. The evaluation of "IDALERT™" was based on that information and the information obtained from government reports. Although the government data/reports showed that there is a potential for a fuel economy savings for heavy-duty vehicles by reducing unnecessary idling time, the limited data from long haul fleets submitted by the applicant did not demonstrate an improvement in fuel economy though the use of "IDALERT™".

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Automobiles Fuel Consumption Trucks Ignition Systems Tests	Fuel Economy Gas Saving Devices	

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES
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by

Edward Anthony Barth

July, 1981

REPRODUCED BY
NATIONAL TECHNICAL
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SPRINGFIELD, VA. 22161

Test and Evaluation Branch
Emission Control Technology Division
Office of Mobile Source Air Pollution Control
U.S. Environmental Protection Agency

Evaluation of IDALERT™ under Section 511 of the Motor Vehicle Information and Cost Savings Act

The following is a summary of the information on the device as submitted by the Applicant and the resulting EPA analysis and conclusions.

1. Marketing Identification of the Device:

"The device is identified as IDALERT™. Model 101-3 fits all vehicles equipped with a speedometer cable that indicates vehicle speed. Model (to be assigned) fits all vehicles that do not have speedometer cables."

2. Inventor of the Device and Patents:

A. Anthony E. Dombrowski
3801 Dahlman Avenue
Omaha, NE 68107

B. "IDALERT™ is patented under patent number 4178580 a copy of which is included in Appendix A." (The patent is Attachment A of this evaluation.)

3. Manufacturer of the Device:

Con-Serv, Inc.
3801 Dahlman Avenue
Omaha, NE 68107

4. Manufacturing Organization Principals:

A. E. Dombrowski, President
June L. Dombrowski, Vice President, Treasurer
Rolla Stevenson, Secretary

5. Marketing Organization in U.S./Identity of Applicant:

Con-Serv, Inc.
3801 Dahlman Avenue
Omaha, NE 68107
(402) 733-8961

6. Applying Organization Principals:

A. E. Dombrowski, President
June L. Dombrowski, Vice President, Treasurer
Rolla Stevenson, Secretary

Person representing Con-Serv, Inc. in communications with the EPA is George R. Sturmon, P.E., consultant to Con-Serv, Inc.
Sturmon & Associates
608 Indian Hills Drive
St. Charles, MO 63301
(314) 946-1975

7. Description of Device (as supplied by Applicant):

A. Purpose of IDALERT™: "Commercial vehicle owners are greatly aware of the vast amount of waste that takes place because of nonproductive idling of their motor vehicles. They are alert to waste of unnecessary warmups, frequent stops at truck stops with motors that remain idling or motors that constantly run while the vehicles are stopped at truck terminals, customer docks or in rest areas. Many companies have policies against unnecessary idling . . . but they find that enforcement is easier said than done. The IDALERT™ can put compliance in the policy and end wasteful idling."

B. Theory of Operation: "When the vehicle comes to a nonproductive mode the IDALERT™ unit is notified and after three minutes* of nonproductive idle time, a red light and buzzer inside the cab are activated. If the driver is in or near his truck, he is reminded by the system that he is wasting precious fuel and should shut off his engine or put his vehicle into gear and become active again. If he ignores this alert or is a distance from his cab so he does not see or hear it, an additional minute will tick by and then the vehicle's horn will be activated and will not stop until the ignition is turned off or the truck is put into a productive state. The second alert from the horn tells everyone in the vicinity that the driver is wasting fuel. IDALERT™ creates a strong incentive to avoid this kind of attention, either in the presence of supervisors or fellow workers."

"*The time element of the IDALERT™ can be adjusted from one minute to five minutes."

C. "Detailed Description of Construction: See Appendix B." Appendix B consisted of engineering drawings of the component parts and is therefore not included as an attachment to this evaluation.

8. Applicability of the Device (as supplied by Applicant):

"IDALERT™ is applicable to all vehicles regardless of make, model, engine, etc."

9. Device Installation, Tools and Expertise Required (as supplied by Applicant):

"See Appendix C." (Appendix C is Attachment B of this evaluation)

10. Device Operation (as supplied by Applicant):

"See Appendix D." (Appendix D is Attachment C of this evaluation)

11. Device Maintenance (claimed):

"IDALERT™ is maintenance free. It is a sealed unit to protect gears with solid state timing circuits."

12. Effect on Vehicle Emissions (non-regulated) (claimed):

"IDALERT™ does not emit or cause to be emitted any pollutants into the atmosphere."

13. Effects on Vehicle Safety (claimed):

"IDALERT™ is completely safe since it is a warning device. It does not in any way effect or interfere with the operation of the vehicle it is installed on."

14. Test Results - Regulated Emissions and Fuel Economy (submitted by Applicant):

"The following companies have field tested IDALERT™ with positive results.

North Express, Inc.
Mobil Oil Company
U. S. Postal Department
Ohio Bell Telephone
City of Toledo, Ohio
Remington Arms Company
Lehigh University
Fischer Bus Service
Sierra Pacific Power Company
Cleveland Electric Illuminating Company
San Jose Mercury Newspaper
Peter Kiewit Sons Company
Boston Edison Company
City of Redondo Beach, California"

"In addition to the above firms listed there are an additional fifty-one companies testing IDALERT™."

15. Information Gathered by the EPA:

To aid in assessing the potential of the IDALERT™ device, EPA requested the Voluntary Truck and Bus Fuel Economy Program Office of Department of Transportation for information on the idle fuel consumption rates and idling time of heavy duty trucks. DOT provided the following information:

A. The information contained in the "Tips for Truckers" pamphlet (Attachment G) submitted by the applicant was still current. This pamphlet provided the following summary of heavy duty idling:

(1) While idling, on the average, a diesel engine will consume about 0.5 gallons of fuel per hour and a gasoline engine about 0.9 gallons per hour.

(2) In urban areas, trucks and buses typically spend 20% to 40% of their operating time idling. The average is 2.5 hours per day of non-productive idling.

(3) For long-haul service, the amount of time spent idling during service is quite low. However, prolonged warmups and idling at truckstops will typically add one hour per day of unnecessary idling.

(4) "Some idling of diesel engines is needed to prevent valve and turbocharger problems, but only after full load operation."

(5) "Too much idling may lead to injector problems in diesel engines and to sludge formation and premature wear in gasoline engines."

(6) A diesel engine left idling to "keep it warm" during a rest stop will initially cool off faster idling than if it were shut off because heat is pulled from an engine by the continued operation of the cooling and exhaust systems.

B. The government conducted a study, "Interagency Study of Post-1980 Goals for Commercial Motor Vehicles," draft June 1976. This study tabulates data on the idle fuel consumption of heavy duty engines (see Attachment I) and reiterated some of the preceding information on vehicle idling.

C. Some preliminary test results of a DOT/SAE/ATA truck and bus fuel economy study were provided. Four pairs (a standard and a fuel efficient model) of highly instrumented vehicles were used for testing and fleet service. Idle time ranged from 1 to 70% of vehicle operating time. Idle fuel usage ranged from 0 to 38% of total fuel usage. However, appreciable idling time did not necessarily greatly increase fuel usage. In many instances the idle time ranged from 15% to 25% of total operating time, but idling consumed only 1% of the total fuel used.

D. DOT provided manufacturer's literature on two idle shutoff devices. Instead of sounding an alarm/warning after excessive idling like IDALERT™, these devices shutoff the engine after a preset time delay.

EPA also contacted Mobil Oil Corp., an IDALERT™ user whom the applicant stated was experiencing good results with the device. Mobil had experienced very favorable results in limited service testing and are now conducting a more controlled test of IDALERT™. However, at this time Mobil is unable to judge the effectiveness of the device.

16. Analysis

A. Marketing Identification of the Device:

In Section 1, the applicant stated there were two models of the device. Model 101-3, for vehicles with speedometer cables, was clearly identified. The marketing description for the device for use on vehicles without speedometer cables is Model 201-3 and was provided to EPA subsequent to the original application (see Attachments D, F, and H).

B. Description of the Device:

The primary purpose of of the IDALERT™ device as stated in Section 7A, is to reduce unnecessary engine idling and thereby reduce non-productive fuel consumption. This is judged to be in agreement with the theory of operation given in Section 7B and the functions the device described in the patent (see Attachment A) should be able to provide. That is, audible and visual warnings to the vehicle operator that the vehicle engine has been idling for an excessive time period.

C. Applicability of the Device:

(1) The applicability of the device as stated in the application (Section 8) ". . . to all vehicles regardless of make model, engine, etc.," is judged to be true but only in the general sense. The Applicant provides only one model for vehicles with speedometer cables (Section 1) yet specifies that the hookup is to by connecting the speedometer cable to the IDALERT™ (see Attachment B). Since speedometer housing cable connectors are not interchangeable among all vehicles, the device could not be hooked up to most vehicles, unless adapters were provided. No adapters were provided.

The applicant stated that Model 101-3 was the original unit marketed but that they now recommend the electronic Model 201-3 and expect it to account for most sales. (Reference telephone call June 3, 1981 between applicant and EPA.)

(2) The IDALERT™ model 201-3 is judged to be applicable to vehicles with or without speedometer cables.

D. Cost

The cost is $87.50 for either model. (Reference telephone call June 3, 1981 between applicant and EPA.)

E. Device Installation - Tools and Expertise Required:

The IDALERT™ instructions appear to be complete for the physical installation of the Model 101-3 (for vehicles with

speedometer cables) and Model 201-3 (for vehicles with or without speedometer cables). These instructions imply that the installation can be readily accomplished by a person with moderate mechanical skills using only common tools (drill, pliers, wrenches and screwdrivers). These implied requirements about the level of expertise and tools required for installation are judged to be correct for the Model 101-3 and Model 201-3.

However, there may be an added installation difficulty for the Model 101-3. Since no adapters are provided and all speedometer cable connectors are not identical, it may not be possible to readily connect the vehicle's speedometer cable to the unit. Additionally, the installer will have to obtain a second speedometer cable and housing that will connect the device to the vehicle.

No installation difficulties are anticipated for the Model 201-3.

The applicant stated that initial installation of the Model 101-3 would typically require 1 to 1 1/2 hours and subsequent installations on a similar vehicle would require 40 minutes. For the Model 201-3, initial installation would require 1 hour and subsequent installations would require 20 minutes. EPA did not attempt to verify these installation times, however, they appear to be reasonable.

F. Device Operation:

The IDALERT™ devices (Model 101-3 and Model 201-3) appear to function as described in Section 7B. Only minimal operating instructions are required for its use and are judged to be adequately covered by the operating instructions (see Attachment C).

G. Device Maintenance:

The application specifies that no maintenance is required for the device. Although this appears true in the general usage of the word maintenance, the speedometer cable, electrical lines and fittings installed would require the normal periodic, albeit infrequent, inspection accorded similar components in the vehicle.

H. Effects on Vehicle Emissions (non-regulated):

Non-regulated emissions were not assessed as part of this evaluation. However, since the device 1) does not modify the vehicle's emission control system or powertrain, 2) trades reduced idle time for more frequent start ups, it appears reasonable to assume that the device would not significantly affect a vehicle's non-regulated emissions.

I. Effects on Vehicle Safety:

When properly installed, it appears unlikely that the device would adversely affect vehicle safety.

J. Test Results Supplied by Applicant:

The test data originally submitted by the applicant was simply a list of companies whom the applicant claimed had achieved positive results (see Section 14).

EPA requested (Attachments D and E) the details of any tests and documentation of DOT statistics referenced in the application. The applicant provided the following information:

(1) The applicant submitted a second list of IDALERT™ users who had achieved positive results by using the device. No supporting documentation or tests results were provided.

(2) The applicant submitted limited test summary information on tests of the IDALERT™ device by several groups (Alameda Utility Co., Land Paving Company, North Colonies Central Schools, and San Jose Mercury News). These tests showed a fuel economy improvement with the device, however, these were relatively uncontrolled tests and did not address the effects of vehicle usage and maintenance, weather, ambient temperature, etc. on the test results.

(3) The truck fleet fuel economy data consisted of vehicle mileage and fuel consumption for two matched fleets of eight trucks each. Each vehicle in one fleet was equipped with IDALERT™. The vehicles were apparently in long haul service.

These results represented relatively uncontrolled tests of the device. They did not consider the effects of vehicle usage, maintenance, weather, ambient temperature, service usage, etc. on the test results. The actual test results have not been attached because most are hand transcriptions of log sheets which would not reproduce properly.

The analysis of the results of these tests revealed no fuel economy benefit for the IDALERT™ device.

17. Discussion

The stated purpose and operational approach of IDALERT™ is the modification of driver habits; i.e. to reduce the amount of time that vehicle operators allow the engines to idle unnecessarily. The information provided indicated that the time required for activation of IDALERT™ is adjustable at the factory to between one minute and five minutes. The EPA did not attempt to quantify the effects of IDALERT™ because all idle periods in appropriate Federal Test Procedures are less than one minute. However, the upper limit of 5 minutes for allowable idling appears to be required only for heavy duty turbocharged trucks after operation at high loads. Thus, most vehicles could be turned off immediately. The only considerations could be wear on the starter motor, the need to operate auxiliary equipment (e.g. cement mixers, ambulances) or to charge the batteries.

While the manufacturer of the device claims that it can be used with all vehicles, it appears that they will focus heavily on operators of fleets in urban areas. On the other hand, the applicant only provided test data on the effects of IDALERT™ on a fleet of sixteen long haul vehicles (8 with and 8 without IDALERT™). These data showed no benefit for the device.

To quantify the potential effects of IDALERT™, the applicant referred to information published by the Department of Transportation which shows that the average idling period is 2 1/2 hours per day for fleet vehicles used on city routes. This average idling time was combined with average idling fuel consumption rates of 0.5 gallons per hour for diesel trucks and 0.8 gallons per hour for gasoline truck engines.

These figures resulted in an estimated average daily fuel usage of over 1 gallon for diesels and 2 gallons for gasoline vehicles. In his sales brochure, the applicant implies that IDALERT™ can save all this fuel. What the applicant appears to have overlooked is that a substantial portion of the 2 1/2 hours of idle is not excess idle, but is normal idling due to traffic lights, congestion, and deliveries. An IDALERT™ unit will be useful only if it is used to identify and terminate periods of excess idle.

The effectiveness of IDALERT™ will also depend on the operator of the vehicle. If the duty cycle includes a substantial amount of excess idling and the vehicle operator turns the engine off when IDALERT™ signals, then a fuel savings will be realized. If the operator either ignores the signal or moves the vehicle a short distance to reset the device, fuel savings will not occur.

18. Conclusions

EPA fully considered all of the information submitted by the device manufacturer in the application. The evaluation of the IDALERT™ device was based on that information and other information obtained by EPA.

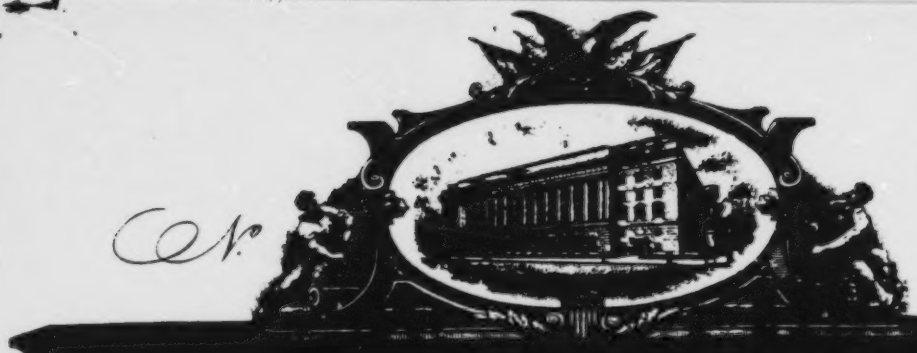
As part of the evaluation, EPA obtained data and reports from DOT which analyzed the potential fuel savings to be gained by reducing unnecessary idling time of heavy duty engines. Although the government data/reports showed that there is a potential for fuel economy savings for heavy duty vehicles, the limited data from long haul fleets submitted by the applicant did not demonstrate an improvement in fuel economy when using IDALERT™. The applicant did not provide test data for IDALERT™ in either short-haul or local trucking service.

The test data supplied with the application was inconclusive or insufficient. However, IDALERT™ could be effective under certain conditions although any savings which could be realized are based on a number of factors. The most significant of these is the amount of "excess" idle time experienced. Another consideration is the possibility that the operator will not heed the signals and will simply reset the timer by moving the vehicle or turning it off and on again. Ultimately, a potential customer must evaluate his own situation to determine whether the use of an idle-limiting device, such as IDALERT™, is warranted.

List of Attachments

Attachment A	Patent No. 4,178,580 (provided with 511 Application)
Attachment B	Installation Instructions (provided with 511 Application)
Attachment C	Operating Instructions (provided with 511 Application)
Attachment D	EPA letter dated December 1, 1980 to George Sturmon, P.E.
Attachment E	EPA letter dated March 18, 1981 to George Sturmon, P.E.
Attachment F	Con-Serv, Inc. letter dated April 17 to EPA.
Attachment G	"Tips for Truckers", a government energy conservation pamphlet provided as part of Attachment F.
Attachment H	IDALERT™ Model #201-3 Installation Instructions, provided as part of Attachment F.
Attachment I	"Interagency Study of Post-1980 Goals for Commercial Motor Vehicles," June 1976, Pages II-16 and II-17.

ATTACHMENT A



No. 4178580

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Whereas, THERE HAS BEEN PRESENTED TO THE

Commissioner of Patents and Trademarks

A PETITION PRAYING FOR THE GRANT OF LETTERS PATENT FOR AN ALLEGED NEW AND USEFUL INVENTION THE TITLE AND DESCRIPTION OF WHICH ARE CONTAINED IN THE SPECIFICATIONS OF WHICH A COPY IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PATENT AND TRADEMARK OFFICE IN THE CLAIMANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID CLAIMANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A PATENT UNDER THE LAW.

NOW, THEREFORE, THESE Letters Patent ARE TO GRANT UNTO THE SAID CLAIMANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID CLAIMANT(S) FOR THE TERM OF SEVENTEEN YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF ISSUE FEES AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM MAKING, USING OR SELLING THE SAID INVENTION THROUGHOUT THE UNITED STATES.

In testimony whereof *I have hereunto set my hand and caused the seal of the* Patent and Trademark Office *to be affixed at the City of Washington this eleventh day of December in the year of our Lord one thousand nine hundred and seventy-nine, and of the Independence of the United States of America the two hundred and fourth.*

Attest:

Sealing Officer

Commissioner of Patents and Trademarks

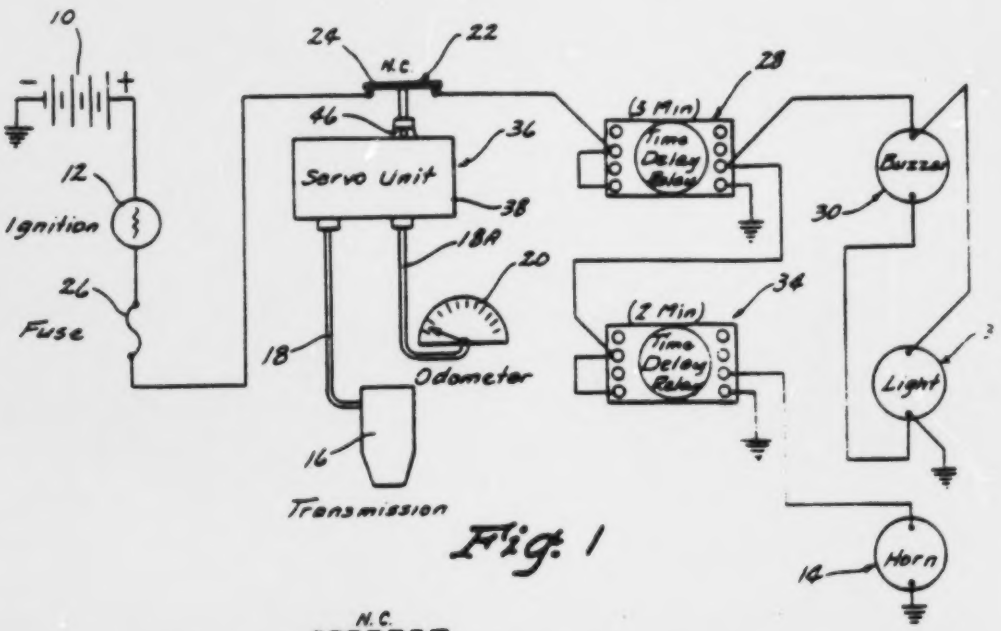


Fig. 1

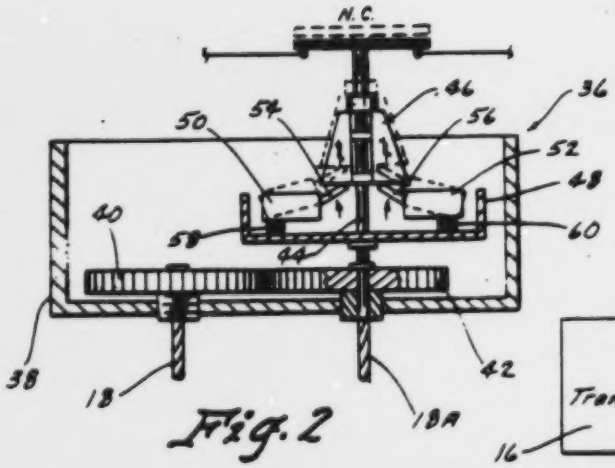


Fig. 2

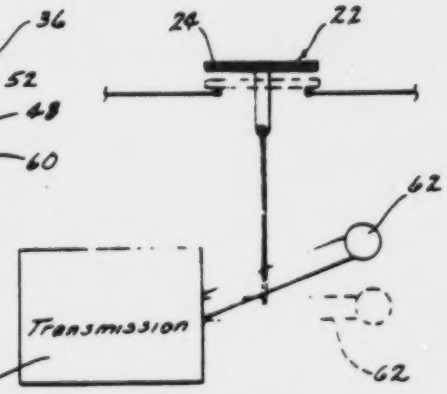


Fig. 3

United States Patent [19]

Dombrowski

[11] **4,178,580**

[45] **Dec. 11, 1979**

[54] FUEL SAVING SIGNALING APPARATUS FOR A MOTOR VEHICLE

[76] Inventor: **Anthony E. Dombrowski**, 9903 Broadmoor Dr., Omaha, Nebr. 68114

[21] Appl. No.: **19,504**

[22] Filed: **Mar. 12, 1979**

[51] Int. Cl.[2] **G08B 21/00**

[52] U.S. Cl. ..... **340/52 D**; 180/271

[58] Field of Search ..... 340/52 D, 52 R, 53, 340/56; 307/10 R; 180/103

[56] **References Cited**

U.S. PATENT DOCUMENTS

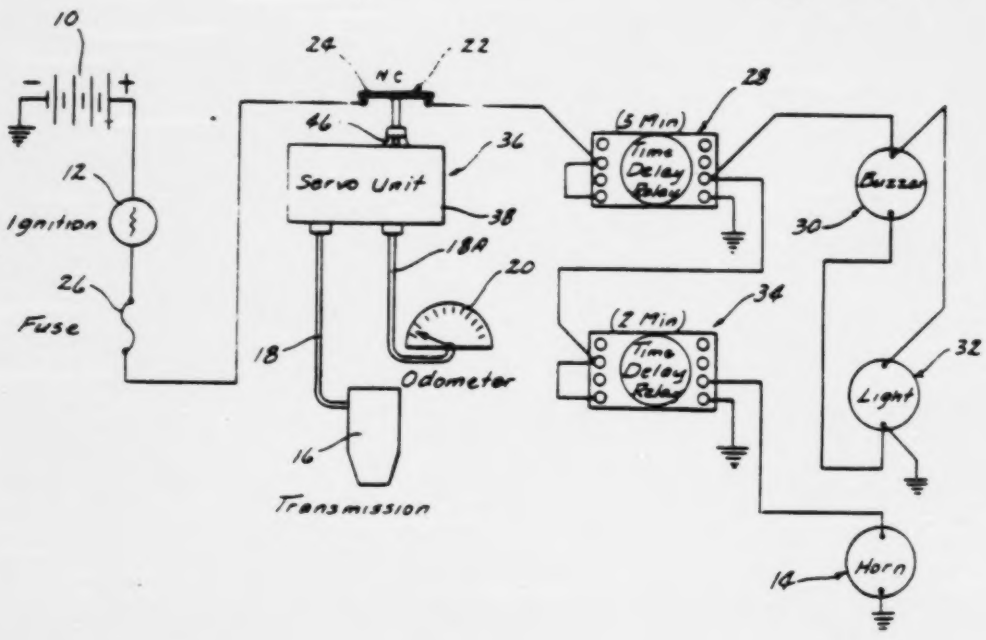
2,729,806	1/1956	Dewhirst	340/52 D
4,134,101	1/1979	Jones, Jr.	340/52 D

Primary Examiner—Alvin H. Waring
Attorney, Agent, or Firm—Zarley, McKee, Thomte, Voorhees & Sease

[57] **ABSTRACT**

A fuel saving signaling apparatus for a motor vehicle is described including a buzzer and indicator light mounted on the dash of the vehicle. The buzzer and indicator light are operatively connected to a time delay relay which is series connected to a microswitch and the vehicle ignition. The microswitch is normally closed so that current will be supplied to the time delay relay when the vehicle ignition is on so that the buzzer and indicator light will be energized after the vehicle has been idling for a predetermined period of time. The microswitch is positioned adjacent a rotatable element such as the vehicle speedometer cable or the like whereby rotation of the speedometer cable, as the vehicle is being driven, will cause the microswitch to be moved from its closed position to its open position thereby preventing as the vehicle is brought to a halt, the microswitch closes soon as the vehicle is brought to a halt, the microswitch closes and the time delay is activated so that the indicator light and buzzer will be energized after the predetermined period of time has elapsed. A second time delay relay is also provided and is connected to the first time delay relay and is adapted to energized the vehicle horn after a predetermined length of time has elapsed after the signal light and buzzer have been energized.

7 Claims, 3 Drawing Figures



FUEL SAVING SIGNALING APPARATUS FOR A MOTOR VEHICLE

BACKGROUND OF THE INVENTION

This invention relates to a fuel saving signaling apparatus for a motor vehicle and more particularly to an improved and simplified fuel saving signaling apparatus for a motor vehicle.

A great deal of fuel is consumed by a motor vehicle if it is permitted to idle for a period of time. Estimates of the amounts of fuel consumed by an idling engine range from 0.6 to 1.3 gallons per hour. Thus, if a driver of a vehicle allows the vehicle to idle for any number of reasons, the vehicle is consuming and wasting much needed fuel and energy.

The objectionable motor vehicle idling problem is very prevalent in the construction industry. For example, it has been noted that heavy equipment operators tend to leave their vehicles running for very long periods of time while attending to other tasks or waiting for other construction operations to be completed.

Attempts have been made to provide devices which will alert the motor vehicle operator that the vehicle has been idling for an objectionable period of time but the previous devices are extremely complicated and are not easily adaptable to motor vehicles. For example, U.S. Pat. No. 2,652,125 illustrates an engine stopping device for a motor vehicle but the device depends upon the movement of a pendulum-like apparatus to prevent the system from being activated. It is believed that the pendulum-like device in U.S. Pat. No. 2,652,125 will be inadvertently energized, thereby preventing the signaling equipment from operating by vibrations caused by the vehicle idling. A second prior art device is disclosed in U.S. Pat. No. 2,729,826 but that device relies upon the oil pressure in the vehicle engine. The oil pressure of a motor vehicle engine will vary considerably depending upon the atmospheric temperature, oil temperature, idling speed, etc. and it is believed that such devices are not practical or desirable for the application of conserving fuel.

Therefore, it is a principal object of the invention to provide an improved fuel saving signaling apparatus for a motor vehicle.

A further object of the invention is to provide a fuel saving signaling apparatus for a motor vehicle which energizes a buzzer and a light on the vehicle dash prior to activating the vehicle horn.

A further object of the invention is to provide a fuel saving signaling apparatus for a motor vehicle which is easily adaptable to the motor vehicle without extensive modification thereof.

A further object of the invention is to provide a fuel saving signaling apparatus for a motor vehicle which cannot be circumvented by the vehicle operator.

A further object of the invention is to provide a fuel saving signaling apparatus for a motor vehicle which will help conserve valuable fuel.

A further object of the invention is to provide a fuel saving signaling apparatus for a motor vehicle which is economical of manufacture and durable in use.

These and other objects will be apparent to those skilled in the art.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view of the circuitry of this invention:

FIG. 2 is a fragmentary sectional view of the means for opening the microswitch; and

FIG. 3 is a schematic view of an alternate method of activating the microswitch portion of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The signaling apparatus of this invention is designed to be attached to a motor vehicle (not shown) including a conventional battery 10, ignition 12 and horn 14. Some motor vehicles such as bucket loaders or the like may not have a horn mounted thereon but it is recommended that a suitable horn 14 be mounted thereon which may be heard over the din of the equipment noise. The numeral 16 refers to the transmission of the vehicle having a speedometer cable 18 extending therefrom in conventional fashion. The numeral 20 refers to the speedometer (odometer) in the vehicle which is normally connected to the speedometer cable 18.

The numeral 22 refers to a conventional microswitch which is normally closed and which includes a switch arm 24 normally held in the closed position by a suitable spring or the like. Microswitch 22 is series connected to fuse 26 and ignition 12.

Microswitch 22 is series connected to a conventional adjustable time delay relay 28. In this particular embodiment, time delay relay 28 is set to function after a five minute period of time has elapsed. Relay 28 is connected to buzzer 30 and indicator light 32 which are provided on the dash of the vehicle. Thus, buzzer 30 and light 32 will be energized five minutes after current has been supplied to relay 28 providing the current has been continuously supplied to the relay 28. Relay 28 is electrically connected to a conventional adjustable time delay relay 34 which is adapted to energize or activate the horn 14 through the electrical connection provided therebetween. Preferably, time delay relay 34 is set to activate the horn 14 two minutes after current is supplied to the relay 34.

The numeral 36 refers to the apparatus which is operatively connected to the speedometer cable 18 to open the switch 22 when the vehicle is being driven. Apparatus 36 includes a housing 38 having a pair of gears 40 and 42 rotatably mounted therein which are in mesh with each other and which have identical specifications. Gear 40 is operatively connected to speedometer cable 18 for rotation therewith. Gear 42 is operatively connected to speedometer cable 18A which is connected to the speedometer 20 in conventional fashion so that the speed of the vehicle will be indicated on the speedometer 20. Shaft 44 is secured to gear 42 and extends upwardly therefrom. A vertically movable collar or sleeve means 46 is mounted on the upper end of the shaft 44 and is adapted to engage the switch arm 24 to open the same when the sleeve 46 has been moved to its uppermost position. Support 48 is secured to shaft 44 for rotation therewith and has a pair of members 50 and 52 pivotally mounted about horizontal axes included therein. Members 50 and 52 have arms 54 and 56 extending therefrom which are adapted to engage the sleeve 46, upon rotation of the shaft 44, to raise sleeve 46 to its uppermost position. The centrifugal force of the rotating support 48 causes the members 50 and 52 to pivot

about their horizontal pivot points 58 and 60 respectively.

The normal mode of operation is as follows. Ignition switch 12 energizes the system when turned on and de-energizes the system when off. With the engine running and the vehicle stopped, the microswitch 22 is in the closed position thereby allowing current to flow to the time delay relay 28. Time delay relay 28 preferably has a five minute delay, and after this period of time, the warning light 30 and buzzer 32 are energized thereby alerting the driver that the vehicle has been idling for an objectionable period of time and alerting the driver that he should turn off the vehicle engine. In the event that the driver or operator is not in the vehicle the time delay relay 34 activates the horn 14 two minutes after the light 30 and buzzer 32 have been activated. The activation of horn 14 alerts the driver should he be away from the vehicle.

The warning light 30, buzzer 32 and horn 14 are deactivated by turning off the vehicle ignition or by putting the vehicle into motion. The warning light 30 and buzzer 32 are prevented from being initially energized upon the driver placing the vehicle in motion prior to the five minute period of time having elapsed. As previously stated, the motion of the vehicle prevents the system from being energized since the rotation of speedometer cable 18 will cause the switch arm 24 to be moved to its open position thereby preventing current from being supplied to the relays.

A modified form of the invention is illustrated in FIG. 3 and is designed to be used on those vehicles which do not have rotating elements such as speedometer cables, tachometer cables, etc. In the embodiment of FIG. 3, the microswitch 22 is normally closed when the vehicle transmission shift lever 62 is in the neutral position but is open when the shift lever has been moved to one of the forward or reverse gears.

Thus it can be seen that a novel fuel saving signaling apparatus has been provided for a motor vehicle which alerts the motor vehicle operator that his vehicle has been idling for an objectionable period of time. The vehicle operator can only deactivate the signaling means by either turning off the engine or by placing the vehicle in motion. The signaling apparatus of this invention will encourage the operators to turn off the vehicle engine thereby conserving precious fuel. The apparatus disclosed herein may be easily mounted on motor vehicles without extensive modification thereof. The apparatus disclosed herein is relatively trouble free and will be dependable in operation.

Thus it can be seen that the invention accomplishes at least all its stated objectives.

I claim:

1. A fuel saving signaling apparatus for a motor vehicle including an ignition system, a source of electrical energy, a motor and a rotatable means which is rotated when the vehicle is driven, comprising,

a normally closed switch means operatively electrically connected to the ignition system and source of electrical energy,

a signaling means,

a first electrical time delay means series connected to said switch means and said signaling means and imposed therebetween,

first time delay means energizing said signaling means after a predetermined period of time has elapsed after said first time delay means has been energized by said switch means,

said switch means being positioned adjacent said rotatable means and being operatively connected thereto so that said rotatable means will cause said switch means to move from its closed position to its open position when said vehicle is being driven thereby preventing the energization of said signaling means while said vehicle is being driven but permitting said switch means to move to its closed position when the movement of the vehicle has been halted thereby energizing said first time delay means so that the signaling means will be energized when the motor vehicle has been idling for a predetermined length of time.

2. The apparatus of claim 1 wherein said signaling means comprises a visual signal means and an audio signal means.

3. The apparatus of claim 2 wherein said vehicle also has a horn mounted thereon and wherein a second time delay means is electrically connected to said horn and said first time delay means for energizing said horn after a predetermined length of time has passed after said visual and audio signal means have been actuated.

4. The apparatus of claim 3 wherein said first and second time delay means each comprise a time delay relay.

5. The apparatus of claim 1 wherein said rotatable means comprises a speedometer cable.

6. The apparatus of claim 1 wherein said switch means comprises a microswitch including a switch arm, said rotatable means comprising a speedometer cable, and means operatively connected to said speedometer cable which engages said switch arm, to move said microswitch to its open position, when said speedometer cable is being rotated.

7. A fuel saving signaling apparatus for a motor vehicle including an ignition system, a source of electrical energy, a transmission and a shift lever operatively connected to said transmission, said shift lever being movable between neutral, forward and reverse gears, comprising,

a normally closed switch means operatively electrically connected to the ignition system and source of electrical energy,

a signaling means,

a first electrical time delay means series connected to said switch means and said signaling means and imposed therebetween,

said first time delay means energizing said signaling means after a predetermined period of time has elapsed after said first time delay means has been energized by said switch means,

said switch means being positioned adjacent said shift lever so that said shift lever will cause said switch means to move from its closed position to its open position when said shift lever is moved from its said neutral gear to either said forward or reverse gears thereby preventing the energization of said signaling means while said shift lever is in forward or reverse gears but permitting said switch means to move to its closed position when said shift lever is in its neutral position so that the signaling means will be energized when the motor vehicle has been idling in said neutral gear for a predetermined length of time.

* * * * *

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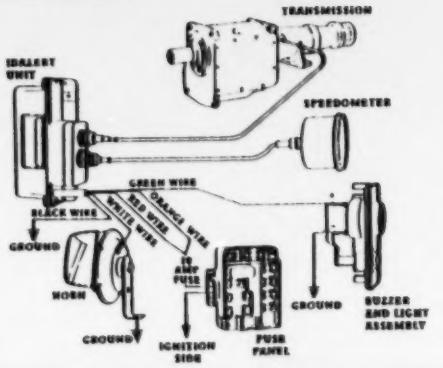
Idalert General Instructions

1. Disconnect existing speedometer cable from transmission and connect to shaft on Idalert™ unit.
2. Mount Idalert™ unit on fire wall, fender well or other desirable location.
3. Measure distance between location of Idalert™ unit and transmission for an additional speedometer cable and connect between Idalert™ unit and transmission.
4. Mount buzzer and light assembly on or under dash.
5. Use Instruction A for negative ground installation or Instruction B for positive ground.

Instruction A

1. Green wire to positive side of buzzer and light assembly. Negative side of buzzer wire to chassis ground.
2. Black wire to chassis ground.
3. White to horn.
4. Connect orange and red wire to the ignition side of fuse panel. (Use 10 Amp. fuse).

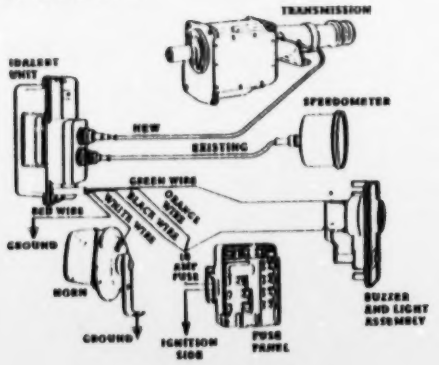
DIAGRAM A



Instruction B

1. Green wire to positive side of buzzer and light assembly. Negative side of buzzer to ignition side of fuse panel 10 Amps.
2. Red wire to chassis ground.
3. White wire to horn.
4. Connect orange and black wire to ignition side of fuse panel (use 10 Amp. fuse).

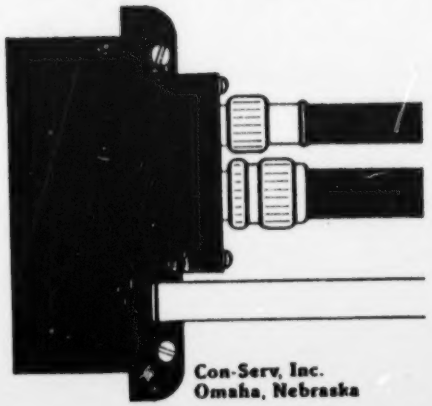
DIAGRAM B



idalert
Con-Serv, Inc.
3801 Dahlman Avenue
Omaha, Nebraska 68107

idalert™

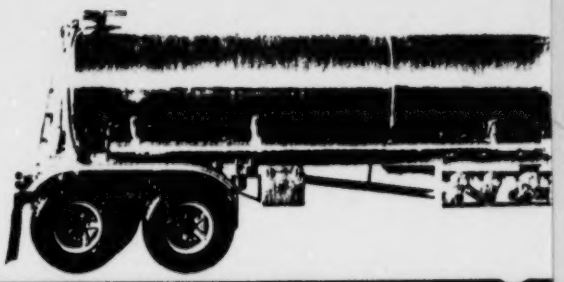
The Fuel Saver Alert System



Con-Serv, Inc.
Omaha, Nebraska

idalert™

The Fuel Saver Alert System



How idalert Works

Idalert™ is a dependable, low-cost way to stretch your fuel allocation. It eliminates non-productive fuel consumption (excessive idling), and enforces a policy to eliminate waste. Idalert™ is adaptable to all vehicles, is fully warranted and can be installed in approximately 30 to 40 minutes.

Why idalert is needed.

The Department of Transportation states that city route vehicles idle an average of 2 1/2 hours per day. Based on an average-size diesel motor that consumes .5 of a gallon of fuel per hour, fuel consumption through idling totals 313 gallons per year. A gasoline motor consumes .8 of a gallon per hour, the equivalent of 563 gallons per year.

idalert is safe, simple, dependable and completely automatic.

Idalert™ turns on and shuts off automatically as the vehicle becomes non-productive or productive. Idalert™ does not turn off your motor. After the vehicle comes to a stop — and after three minutes of excessive idling — the Idalert™ activates a buzzer and flashing warning light on the dash. If the driver ignores the warning, or is away from his vehicle, the horn is activated after an additional minute. This forces the driver to either become productive or turn off the engine, thus conserving non-productive fuel.

idalert pays big dividends for fleet owners.

Fleet owners can expect significant savings no matter what the size of their fleet. Examples, based on DOT statistics:

1,000 diesel vehicles	Save 313,000 gallons per year
100 diesel vehicles	Save 31,300 gallons per year
10 diesel vehicles	Save 3,130 gallons per year
1,000 gasoline vehicles	Save 563,000 gallons per year
100 gasoline vehicles	Save 56,300 gallons per year
10 gasoline vehicles	Save 5,630 gallons per year

idalert added to your fleet means:

*Reduction of non-productive fuel consumption
*Reduction of non-productive equipment wear
*Reduction of non-productive labor
*Reduction of foreign oil imports
*Stretching your fuel allocation

Who needs idalert?

*fleet owners
*government vehicles
*police vehicles
*maintenance vehicles
*mass transit buses
*passenger vehicles
*small trucks
*farm vehicles
*auto/truck leasing companies
*utility company cars and trucks
*contract tow companies
*parking area vehicles

ATTACHMENT C

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ANN ARBOR, MICHIGAN 48105

ATTACHMENT D

OFFICE OF
AIR, NOISE AND RADIATION

December 1, 1980

Mr. George Sturmon, P.E.
Sturmon & Associates
608 Indian Hills Drive
St. Charles, MO 63301

Dear Mr. Sturmon:

The EPA Engineering Evaluation Group has reviewed your application for evaluation of "Idalert™ under Section 511 of the Motor Vehicle Information and Cost Savings Act. This review indicates that information in the following areas is required prior to further processing of your application:

- Please provide support documentation for referenced Department of Transportation statistics relative to vehicle idle time, to include percent of operation at idle and average duration of idle periods.

- Your application references numerous firms which have used your device with positive results. Please provide support documentation outlining each firm's test program used to evaluate your device.

Your cooperation in this matter and rapid response are appreciated. If you have any questions relative to the requested information, please feel free to contact my office (313-668-4299).

Sincerely,

Merrill W Korth

Merrill W. Korth, EPA Device Evaluation Coordinator
Test and Evaluation Branch

cc: F.P. Hutchins
R.N. Burgeson

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

ANN ARBOR, MICHIGAN 48105

ATTACHMENT E

OFFICE OF
AIR, NOISE AND RADIATION

March 18, 1981

Mr. George Sturmon, P.E.
Sturmon & Associates
608 Indian Hills Drive
St. Charles, MO 63301

Dear Mr. Sturmon:

Since we have not received a response from you regarding our letter dated December 1, 1980, we are preparing to complete our evaluation of the "IDALERT" device based on the information submitted with your application. You have not answered the questions we asked in that letter nor provided valid data to support a fuel economy claim for the device. If we do not receive answers to the questions in our December 1, 1980 letter, by April 27, 1981, we plan to complete our evaluation with the information at hand. That information does not indicate a fuel economy benefit for the device.

We have a question concerning the information you have sent us on the use of your device on vehicles without speedometer cables. For these vehicles please provide the model number (if now available), detailed description of device, applicability, and installation and operating instructions.

Sincerely,

Merrill W. Korth

Merrill W. Korth, Device Evaluation Coordinator
Test and Evaluation Branch

cc. P. Hutchins
T. Barth

Enclosures

hmc

511 file "IDALERT"

ATTACHMENT F

Con-Serv, Inc.

3801 Dahlman Ave.
Omaha, Nebraska 68107
402-733-8961

A.E. DOMBROWSKI,
President

JUNE L. DOMBROWSKI,
Vice President, Treasurer

ROLLA STEVENSON,
Secretary

April 17, 1981

Mr. Merrill W. Korth
Device Evaluation Coordinator, T&E Branch
U.S. Environmental Protection Agency
Ann Arbor, Michigan 48105

Dear Mr. Korth:

This is in response to your letters written to George Sturmon, dated March 18, 1981 and December 1, 1980, asking for information in regard to Idalert, the Fuel-Saver Alert System.

1. Response to information requests according to your letter dated December 1, 1980:

   . Please provide support documentation for referenced Department of Transportation statistics relative to vehicle idle time, to include percent of operation at idle and average duration of idle periods - SEE ATTACHED EXHIBIT NO. 1.

   . Your application references numerous firms which have used your device with positive results. Please provide support documentation outlining each firm's test program used to evaluate your device - SEE ATTACHED EXHIBITS NOS. 2 AND 2A.

2. And finally, in response to information request according to your letter dated March 18, 1981:

   . We have a question concerning the information you have sent us on the use of your device on vehicles without speedometer cables. For these vehicles please provide the model number (if now available), detailed description of device, applicability and installation and operating instructions - SEE ATTACHED EXHIBIT NO. 3.

I hope the information attached will enable you to complete your evaluation of Idalert, the Fuel-Saver Alert System. However, if more information is needed please don't hesitate to contact me at 402-733-8961.

Respectfully yours,

Fred A. Colanino

Fred A. Colanino
Director of Marketing

FAC/bls
attmts.

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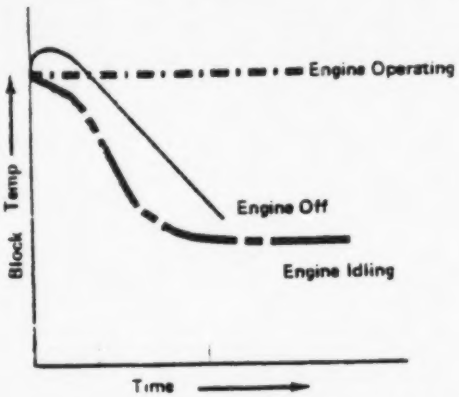
Federal Energy Administration
Washington, D.C. 20461

Often a diesel engine is left idling over the lunch hour to "keep it warm" and prevent it from cooling off. In fact, an engine will cool off faster when it is left idling than when it is shut off. This is because heat is pulled from an idling engine by the continued operation of the cooling and exhaust systems. Since these systems stop operating when an engine is turned off, a shut-down engine retains more heat over the short-term than one left idling.



In addition, safety and security are your benefits when a truck is not running, the ignition keys are removed, and the transmission is in gear.

Is Idling Always Bad?

Up to 5 minutes of idling is needed to cool down a diesel engine that has been working hard. Turbocharger failures and valve problems can result if a hard-working engine is simply turned off with no idling. So, over-the-road drivers must be educated to follow the "golden mean"—a little idling is good, but a lot is bad.

However, engines operating at light loads, such as in typical stop-and-go traffic, can and should be shut off immediately.

In some cases, "automatic idlers" or "engine timers" may be used to provide the proper amount of idling time needed. The driver can set these devices to allow the truck to idle for a pre-determined time, then shut off automatically. These devices retail from around $20 to $90.

In some States and municipalities, it is against the law to leave idling vehicles unattended. But regardless of whether such a law exists where you operate, it is a safe and fuel-efficient practice to turn off vehicle engines not in use.

Remember

- Diesel engines use significantly less fuel than gasoline engines at idle.
- A 20 percent reduction in idling can save up to $56 per year for each truck you operate.
- Properly performed tuneups save fuel for both running and idling engines. Pay special attention to proper idle speed adjustment.
- Some idling of diesel engines is needed to prevent valve and turbocharger problems but only after full load operations.
- Too much idling may lead to injector problems in diesel engines and to sludge formation and premature wear in gasoline engines.

These tips are part of a series of technical hints for saving fuel. For additional information, contact:

Truck and Bus Program
Voluntary Conservation Programs Office
Federal Energy Administration
Washington, D.C. 20461

Tips for Truckers

Energy Conservation Now

Federal Energy Administration

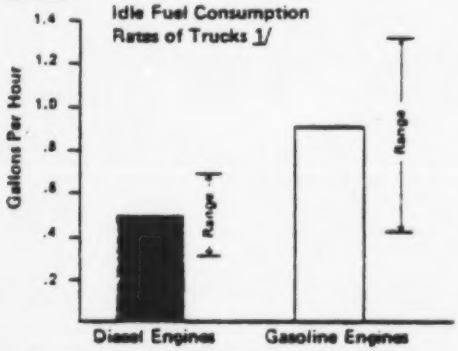
Department of Transportation

Environmental Protection Agency

IDLEness is WASTEFUL!

How Much Fuel and Money are You Wasting Through Unnecessary Idling?

Under idling conditions, a diesel engine will use about 0.5 gallons of fuel per hour on the average and a gasoline engine will use about 0.9 gallons per hour.



1/ Environmental Protection Agency experimental test data.

For trucks and buses operating in urban areas, time at idle represents from 20 to 40 percent of total operating time—depending on route and traffic constraints—even without allowing for unnecessary idling at delivery points or during coffee breaks.

For long-haul trucks, the amount of time spent under idling condition while hauling freight is quite low, but prolonged warmups in the morning and idling at truckstops can add up to an hour a day of unnecessary idling.

Over the course of a year, idle time translates into gallons, dollars, and cents wasted:

Estimated Annual Idle Fuel Use and Cost Per Truck

Type of service	Idle time per day	Gasoline (.50/Gal) Gal/year	Gasoline (.50/Gal) $/year	Diesel (.40/Gal) Gal/year	Diesel (.40/Gal) $/year
Over the road	1 Hour	225	$113	125	$ 50
City	2.5 Hours	563	$281	313	$125

Much of this waste and expense can be eliminated.

Idling engines result in 0 miles per gallon; therefore, even a 10 percent reduction in wasteful idle time will save you money and fuel on every vehicle you operate.

Are There Other Benefits From Reduced Idle Time?

According to one major diesel manufacturer, idling an engine more than 5 minutes may foul the injectors and thus reduce performance.

Annual Fuel and Dollar Savings From Reduced Idle Time

Type of engine	10% Reduction Gal. savings	10% Reduction $ savings	20% Reduction Gal. savings	20% Reduction $ savings
Diesel	13-31	$ 5-$10	25-63	$10-$20
Gasoline	25-56	$11-$28	55-113	$22-$56

Excessive idling of gasoline engines often result in overheating, oil sludge formation, and premature wear.

GENERAL INSTRUCTIONS

1) Mount "IDALERT" unit on fire wall, fender well or other desirable location.

2) Mount buzzer and light assembly on or under dash.

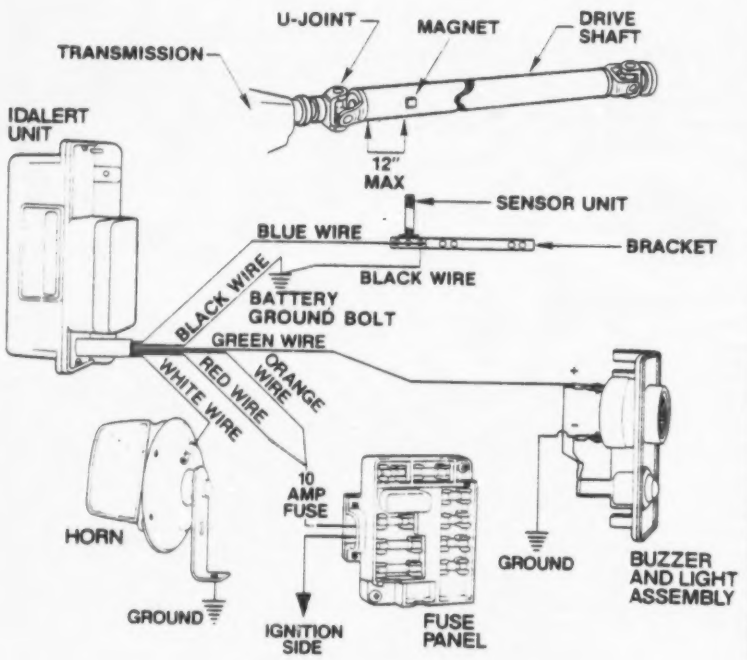
3) Mount magnet within 12" of knuckle to driveshaft of vehicle in area most accessible. (Instruction sheet included in package with magnet and sensor switch.)

4) Mount Electronic Sensor unit within one quarter (¼") inch of magnet rotation. Connect blue wire on sensor to blue wire on "IDALERT" and black wire on Sensor to ground on "IDALERT".

5) Use Instruction A for negative ground installation or Instruction B for positive ground.

INSTRUCTION A

1. Green wire to positive side of buzzer and light assembly. Negative side of buzzer wire to chassis ground.
2. Black wire to chassis ground.
3. White to horn.
4. Connect orange and red wire to the ignition side of fuse panel. (Use 10 Amp. fuse).



ATTACHMENT H

INSTALLATION OF MAGNET AND SENSOR ON DRIVESHAFT - MODEL #201-3

1) *Look for an existing bolt on transmission housing (or nearby) for mounting sensor bracket in a position which will let you meet the following requirements.*

   a) *Magnet should be mounted on driveshaft within 12" of knuckle of transmission.*

   b) *Sensor, when mounted on bracket provided will be located so space between sensor or magnet is one quarter inch (¼").*

   c) *Sensor, when mounted, will not be exposed to damage from loose road objects, moving parts of car suspension, underbush, drive through car wash mechanisms, etc.*

2) *When best location for bracket has been selected remove mounting bolt and drill bracket to fit. Do not mount bracket at this time. Bracket may be mounted to underside of floorboard or any other convenient location adjacent to driveshaft.*

3) *Attach sensor to bracket with mounting stud. Do not over-tighten nuts or sensor may be damaged.*

4) *Temporarily hold bracket in place. Bend as necessary so sensor head is aimed at place where magnet will pass and will be ¼" away from magnet. Mark spot on driveshaft where magnet is to be located.*

5) *Lay bracket aside and clean spot on driveshaft down to shiny metal. The spot should be larger than the magnet.*

6) *Remove wristwatch before handling magnet. Read instructions on epoxy package (including CAUTION), mix epoxy and apply to base of magnet. Also apply epoxy to cleaned spot. Press magnet against prepared spot. Remember — in hot weather you have only three minutes to complete this process. Wrap tape around driveshaft to secure magnet to prevent buildup of dirt and shavings. Allow at least 30 minutes to set up before driving vehicle.*

7) *Attach sensor bracket in location chosen. Tighten mounting bolt(s) securely.*

8) *Route the sensor wires to "IDALERT" clearing all hot or moving parts. Use tie straps as required. Follow instructions on instruction sheet for remaining installation. Keep wires away from Ignition System.*

9) *Sensor unit must be within tolerance of distance to magnet. Adjustment necessary to trigger sensor can be made by adjusting mounting stud.*

NEGATIVE GROUND

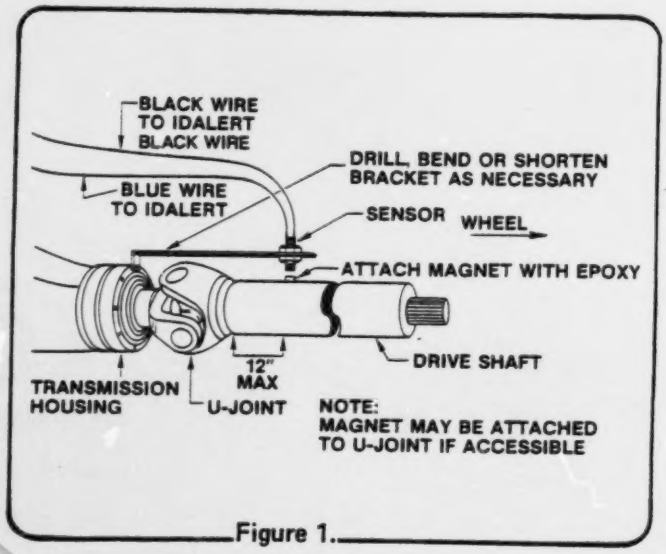


Figure 1.

POSITIVE GROUND

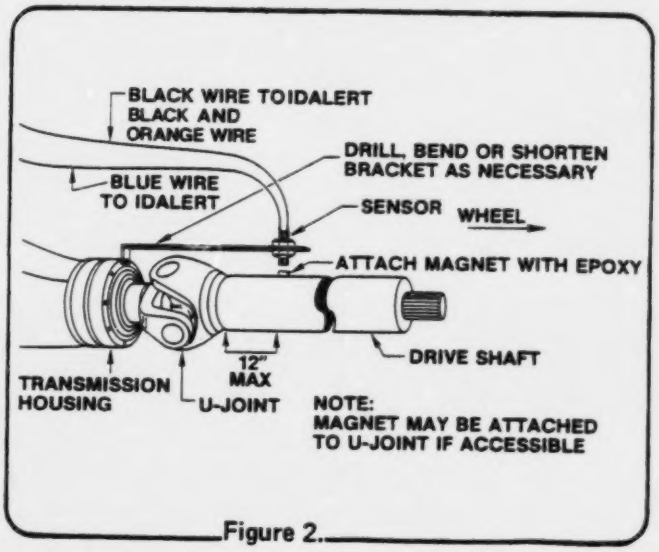
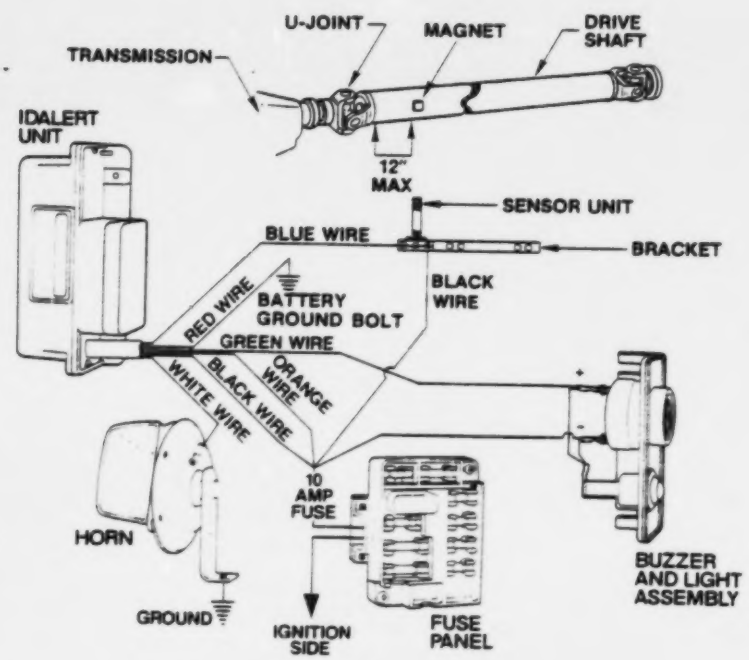


Figure 2.

INSTRUCTION B

1. Green wire to positive side of buzzer and light assembly. Negative side of buzzer to ignition side of fuse panel 10 Amps.
2. Red wire to chassis ground.
3. White wire to horn.
4. Connect orange and black wire to ignition side of fuse panel (use 10 Amp. fuse).



engines..." shown in this Figure, "...are currently in production and these represent approximately a 20 percent improvement over the diesel engine offered in the 1947-1965 period. The improvement over the gasoline engines is very nearly 50 percent."[16]

(4) Idling. Possible further improvement in the basic diesel engine cycle is suggested by current research on the so called "bottomming cycle." In this approach, the waste heat of the exhaust gas is used to drive a separate Rankine cycle heat engine. ERDA has estimated a 15 percent increase in fuel efficiency from the bottomming cycle used to augment driveline power or to drive accessories.

Unnecessary idling of either gasoline or diesel engines can, in the aggregate, waste a very substantial amount of fuel. In addition, it can cause injury to the engine. During short stops it is often easier for the driver to keep the engine running. Over-the-road trucks may be left running to guard against starting problems when the driver returns to the truck, for instance after a lunch break, or to keep the cab warm in the winter.

Published estimates of the cost of idling a diesel engine range from 1/3 to almost 2 gallons per hour of fuel wasted.[17] Gasoline engines burn substantially more fuel when idling. Actual idling tests performed by the Environmental Protection Agency on a few engines show the following idle fuel rates:

Diesel		Gasoline	
Engine	Gal/Hr	Engine	Gal/Hr
Cat 1160	.35	Ford V-8 361 in^3	.61
Cat 1673C	.14	Chevrolet V-8 366 in^3	1.02
DDA 8V71N	.63	Ford 300 in^3	.67
Mack ENDT-675	.42	Chevrolet 250 in^3	.96
IHC DV-550B	.45	IHC V-8 304 in^3	.38
Mack ENDT-865	.42	Dodge V-8 318 in^3	.38
Cummins N-927	.49	Average	.68
DDA 8V71N	.42		
Average	.42		

EPA found that idle fuel rates vary widely from engine to engine. They believe this is a function of idle speed and state of tune. For example, they found that the Ford V-8 (361 in^3) which is installed in a 26,000 lb.

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16 L. F. Donnelly, Mack Trucks, Inc., Fuel Economy Considerations in Heavy-Duty, Over-the-Road Trucks, verbal presentation at the December 9, 1975 meeting of the Society of Automotive Engineers, (Washington, D.C. Section).

17 "To Idle or Not to Idle," Heavy Duty Trucking, September 1975, p. 33. and SPS Instrument Company Advertising Pamphlet, Pasco, Washington.

GVWR truck changed from .86 gal/hr to .61 gal/hr as a result of a tune up.[18] Increased starter maintenance costs are the principal deterrent to turning engines off rather than idling in city pick-up and delivery work (this is a particularly important factor for diesels). Many fleets, including the United States Postal Service (the nation's largest truck fleet) are moving to educate their drivers to turn the engine off whenever they leave the vehicle for fuel economy, security, and safety reasons.

In the case of hard-working engines, such as over-the-road diesels, a short period of idling, not to exceed five minutes, is necessary after a hard run. This assures that the rotating parts of the turbocharger have cooled down and are properly lubricated before shutting the engine down, and allows the entire engine to stabilize in temperature. Engine valve and turbocharger damage have been reported without this cool-down period. The inconvenience of waiting a few minutes before shutting the engine down may be one reason why engines are often left running. A number of devices are now available which will shut down the engine a pre-determined time after the driver has left the vehicle, taking the key with him. These devices, costing from around $20 to $90 each, require the driver to set or activate them before leaving the vehicle. We believe that devices will be offered which will make engine shutdown totally automatic, in a prescribed time after the vehicle stops moving, whether or not the driver turns off the ignition switch or removes the key. We can see no reason why they may not become universally used in the 1980's if they provide for driver override (for example, in the case where the vehicle is stuck in traffic rather than parked at the restaurant) and they sense when the engine is needed for operation of the power-take-off (such as in the case of cement mixers).

The use of tachographs (devices continuously recording engine rpm or vehicle speed vs. time) can also show unnecessary idling. However, to be effective they must be carefully read and used by management.

b. Lubricants. Two areas in which lubricant improvement in the decade of the 1980's will probably lead to improved fuel economy are readily visible. Decreased engine and drive train friction losses can be expected through the widespread use of one or both of these improvements.

Molybdenum Disulfide (MoS_2) has been available as an oil additive for at least 15 years. Many of the problems encountered in its early use seem to have been solved at this time. Climax Molybdenum reports that

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[18] Letter from Gary W. Rossow, Standards Development and Support, U.S. Environmental Protection Agency, Ann Arbor, Michigan, to U.S. Department of Transportation, December 16, 1975.